

National Aeronautics and Space Administration



NASA Kennedy Space Center's Laboratories Capabilities

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Applications

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KSC Laboratories Capabilities Overview

1. Materials & Processes (M&P)
2. Electrical
3. Rapid Prototyping
4. Life Sciences & Environmental
5. In-situ Surface Resource Utilization (ISRU) and Surface Systems
6. Environmental Mitigation, Biomedical Research, and Green Technologies
7. Lifecycle Modeling and Simulation and IT Services
8. Launch Equipment Test Facility
9. Command, Control, and Monitoring Systems



Materials & Processes (M&P)

- ☐ Materials Testing
- ☐ Cryogenics
- ☐ Chemical sampling and analysis
- ☐ Corrosion
- ☐ Electrostatics
- ☐ Tensile, compression, and fatigue
- ☐ Vibration
- ☐ Thermal vacuum and environmental chamber
- ☐ Materials compatibility
- ☐ Precision measurement/metrology
- ☐ Nondestructive evaluation
- ☐ On-site forensic testing and failure analysis
- ☐ Prevention, detection, and mitigation of material damage
- ☐ Extreme temperatures and low flammability
- ☐ Static electricity and dust mitigation
- ☐ Smart coatings
- ☐ Composite materials repair
- ☐ Self-healing material processes
 - ☐ Shape memory alloy self healing metals
 - ☐ Self healing wire
 - ☐ Low Temperature Shape Memory Alloys (SMAs) for adaptive, autonomous systems



Electrical

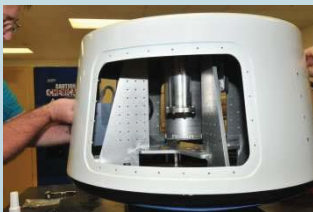
- Full life cycle support including concept development, prototyping, design, troubleshooting, testing, etc. for power, command, monitoring, and control systems:
 - Critical sensors & transducers (cryo/hydrogen)
 - Hazardous gas detection
 - High speed data acquisition
 - PLC based control systems
 - Range technology (tracking, telemetry, & comm)
 - Software - system applications & embedded
 - Health management systems
 - Electromagnetic interference monitoring & mitigation
 - Environmental and qualification testing



Rapid Prototyping

Design Engineering Services

- Mechanical/electrical engineering design
- Mechanisms and kinematics
- ProE CAD/CAM
- "Design for Manufacturability" consultation
- Structural and finite element analysis

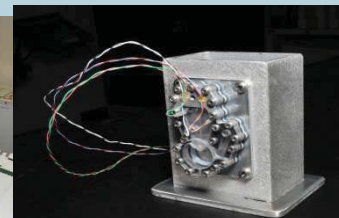


Mechanical Integration Services

- Pneumatics and hydraulics fabrication
- Rapid prototyping / additive manufacturing
- Mechanical & structural fabrication and testing
- Computer Numeric Control (CNC) machining
- Sheet metal fabrication
- Welding & soldering
- Composite materials fabrication
- COTR of 8 Mechanical IDIQ contracts

Electrical Integration Services

- Power and electrical systems
- Electrical fabrication
- Data acquisition
- LabVIEW software programming





Life Sciences and Environmental

- Applied, fundamental, and translational research in genetics, microbiology, molecular biology, and plant science



- Biological imaging, cell/molecular biology, DNA sequencing/gene expression, and microbial enumeration/identification
- Design, fabricate, and test biological reactors and environmental control systems for bioregenerative water recovery and waste treatment
- Closed-loop environmental control and life support systems





In-situ Surface Resource Utilization (ISRU) and Surface Systems

- Remote habitation, volatiles extraction, and environmental protection on surfaces beyond earth, including, oxygen, water, and fuel production, excavation/handling, & tele-robotics.
 - Oxygen, water, and fuel production and waste processing
 - Methane regeneration
 - Solar energy for oxygen extraction
 - Lunar regolith particle separation for further processing
 - Regolith excavation and handling
 - Habitation and Radiation Shielding
 - Dust Mitigation
 - Rocket Plume Blast Effects
 - Robotics and Tele-Robotics



RESOLVE



Environmental Mitigation, Biomedical Research, and Green Technologies

- Field deployment of remediation materials & technologies
- Particle separation methods
- Design, fabrication, and testing of personal protective equipment and breathing apparatus prototypes
- Design and fabrication of emergency medical equipment and communications devices
- Design and implementation of physiological protocols for human testing, both lab based and remotely
- State-of-the-art biological and molecular imaging facilities
- Green Technologies – Alternative Energy Prototypes
 - Hydrogen Power
 - Solar Energy
 - Superconducting Magnetic Energy



Lifecycle Modeling and Simulation and IT Services

- Full lifecycle simulation development including command-and-control operations, supply chain management, process flows, discrete events and human factors impacts
 - Human Centered Engineering of Safety Critical Systems
 - Analyze and Evaluate Life Critical System Failure Modes & Effects
 - Extend “human factors” into the workings and human mind
 - Human Centered Automation in the context of Safety Critical Systems
 - Collaborative Systems Engineering
 - Apply advanced interactive system and methods to Safety Critical System controls
 - Multi-modal Interfaces, Ubiquitous Computing, Distributed Cognition
 - Human Centered Information Flows for Socio-Cognitive





Launch Equipment Test Facility

- Full-scale umbilical and ground support equipment (GSE) testing with vehicle motion and lift-off simulation
- LN2 and LH2 flow to subject test articles to cryogenic temperatures and pressures that simulate launch processing conditions
- Component testing using LN2, LH2, GN2, GHe, Water, or hydraulic fluid
- Data acquisition up to 352 channels with recording speeds up to 60 million samples per second
- Programmable logic controller (PLC) / Controls development
- Structural testing/proof load testing of lifting hardware, slings, etc, up to 600 tons
- Instrumentation services (fixed & portable)
- Pyrotechnics testing
- Test Engineering



Vehicle Motion Simulator



Command, Control, and Monitoring Systems

- Smart command, control, and monitoring of ground and flight systems including health management capability and tele-robotics.
 - Range Technologies – Tracking, Surveillance, Communications, and Telemetry
 - Autonomous Flight Safety Systems
 - Critical Sensors & Transducers (Cryogenic & Hydrogen)
 - Hazardous Gas Detection
 - Operational Health Management Systems
 - Weather Technologies
 - Tele-robotics



Questions?





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